stored databases can be updated periodically if necessary by sending the user storage devices containing a new version of (or new portions of) the databases.

It is very expensive to build a database. One way to recover the costs of constructing and maintaining a database ("Return On Investment", or ROI) is to charge a flat subscription or access fee to each user subscribing to use the database. If this is the only billing method used, however, infrequent users of the database may be discouraged from subscribing, because they would be asked to pay the same cost a frequent user pays. Thus, many database owners charge subscribers a nominal subscription fee, and then periodically (e.g., monthly) charge users a fee calculated in accordance with the amount the user has used the database.

While it is easy to measure the amount someone uses a centralized database (e.g., simply time each access session length and store the time information with user identification information), there is no convenient way to measure the usage of a database residing on a user's own computer, or to convey such usage information to the owner of the database. Techniques are known for automatically, electronically measuring consumption of a commodity such as electricity, water or gas, storing the measurements in a memory device, and periodically downloading the stored measurements over a telephone line to a central billing computer. Unfortunately, these known techniques are not readily adaptable to database usage metering, and moreover, are neither secure enough nor provide the security against database piracy that most database owners demand.

The prevention of unauthorized database usage becomes a huge problem whenever a stored database leaves the possession and control of the database owner. Computer program manufacturers lose millions of dollars each year to "pirates" who make unauthorized copies of software and distribute those copies for profit. Complex databases are often even more expensive to produce than programs, so that potential contributors of data base properties, as well as database owners themselves, may be extremely hesitant to permit electronic copies of their properties or databases to leave their control copies will be made. The copyright laws and contractual licensing agreements may deter, but will not prevent, unauthorized use and copying of database.

SUMMARY OF THE INVENTION

The present invention provides a database access system and method at a user site which permits authorized users to access and use the database and absolutely prevents unauthorized database use and copying. The present invention also provides a facility for measuring usage of the on-site database for the purpose of billing the user according to the amount he has used the database, and for periodically conveying the measured usage information to the database owner (or his agent) — while preventing the user from tampering with the measured usage information.

The invention solves fundamental media based electronic publishing issues including:

Security of the information base. The present invention provides a code/decode Interlock System which includes both software and a tamper proof hardware module that prevents unauthorized and/or unmetered use of a protected information base. The present invention also supports a multi-level coded security access system limiting access to various portions of a data base only to those individuals possessing the proper security code(s); and

Ascertaining the degree of usage of the information base. The present invention stores, in one of several alternative forms of non-volatile memory, the dates and times that any files (or documents, sections, properties, etc.) are accessed and also records the amount of information read from each file into memory by the user.

With the present invention, a CD-ROM disk, for example, might contain all issues of **10** separate publications (technical, medical, business, etc.) going back for five years. Each publisher would be able to set the price for the use of its publication or publications and each publisher could then receive a "copyright royalty" return-on-investment based on the actual customer usage of the publishers' products. Therefore, publishers contributing more important, popular or costly to develop lexical information base properties could earn revenues commensurate with the market demands and pricing strategies for their products.

The present invention eliminates the necessity of determining how much of the net revenue of a CD information base product each contributing publisher should receive (currently an issue of considerable concern to publishers). The present invention also ensures the data security of information bases — a critical, frequently voiced, and previously unanswered problem causing considerable publisher anxiety. It would be quite difficult (requiring a high level of specialized expertise and costly high-powered computers) to "break" the hardware/software data security system provided by the present invention and copy material without being charged an appropriate fee.

Publishers can license their products at an exceptionally low initial cost to customers (i.e. for a $25.00 initial fee instead of a $1,000.00 or more annual fee). Low initial licensing fees would result from the usage auditing capability of the present invention and would allow new clients to experiment with the product at little or no risk. Similarly, customers who anticipate a low level usage of a given information base product may find the lower costs of a usage based fee schedule a practical and affordable justification to acquire a product that would otherwise not be purchased.

In sum, the present invention will:

1. Significantly accelerate market penetration of electronically published products due to substantially lower initial license costs;

2. Greatly enhance the ultimate market penetration of CD published products by making CD publications affordable to a much larger body of customers; and

3. Produce higher ultimate revenues per published disk from those customers who would otherwise have purchased a costlier version of the database product.

The security protection provided by the present invention will give publishers significant advantages in securing exclusive contracts for important publishing information base properties, since the invention provides the information base property contributors with:

1. Vastly superior copy protection security;

2. Ultimately greater revenue;

3. Publisher specific control over pricing; and

4. A return-on-investment commensurate with the market demand for their information base property.

In accordance with one important feature of the present invention, a storage medium stores the database in encrypted form, and also stores index information